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The Draize Eye-Irritancy Test

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The Draize Eye-Irritancy Test

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Janice C. Swanson
Animal Welfare Information Center

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THE DRAIZE EYE-IRRITANCY TEST

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INTRODUCTION

The Draize eye-irritancy test, developed in 1944 by J.H.Draize et. al. (31), provided an experimental procedure and scoring system for the assessment of the eye irritation potential of several groups of products used by man. The four primary groups which require eye irritation assessment studies are: 1) pharmaceuticals (eye therapeutics), 2) cosmetics and toiletries (make-up, shampoo, soap, etc.), 3) consumer products (household detergents and chemicals) and, 4) industrial chemicals (hazardous chemicals handled by workers) (7).

The albino rabbit is the most frequently used animal model for eye-irritation testing. The rabbit eye is highly sensitive, more so than human or monkey, and is considered to maximize the probability of detecting an irritant substance (23). The Draize eye-irritancy test procedure involves the instillation of approximately 0.1 ml liquid or 0.1 g solid material (potential irritant) into one eye of 4 to 6 rabbits while utilizing the other eye as a control. Tissue changes are noted as they develop in the iris, cornea and conjunctiva over the course of a specified time period. Scores are developed based on the nature of the change and on the maximal response produced in the rabbit eye (23, 85, 88).

Several advantages and disadvantages have been identified with regard to the use of the Draize eye-irritancy test. Some of the rationale for the use of this test procedure are:

1) provides a whole animal and organ evaluation,
2) complete products or specific chemicals can be tested in concentrated or dilute form,
3) observation of the recovery and healing process,
4) several Acts require eye-irritation tests,
5) yields quantitative and qualitative information under the Draize scoring system,
6) the test is easily modified,
7) a rabbit is easy to handle,
8) the ocular surface area of the albino rabbit eye is large and is easy to interpret degree of inflammatory response, and
9) the Draize test is a conservative estimate of eye-irritation that err's in favor of man (7).

However, the Draize eye-irritancy test has been severely criticized by animal welfare groups and scientists for:

1) lack of reproducibility of results from laboratory to laboratory,

2) the subjectiveness of scoring and lack of fine discrimination of differences,
3) lack of applicability to man based on basic physiological differences between the human and rabbit eye, and
4) the ethical unacceptability of the test itself (7, 13, 14, 15, 85, 88).

Although the Draize eye-irritancy test has undergone modifications to reduce pain (23, 25), ethical unacceptability in conjunction with concern for inconsistency of results has motivated scientists to search for in vitro alternatives. An in vitro test has been defined as a reaction or biological process that takes place in an artificial environment (e.g. petri dish) as opposed to in vivo tests where biological processes or reactions are monitored in a living organism (e.g. rabbit). Several types of in vitro tests have been developed to assess different aspects of irritancy. Cell toxicity, or cytotoxicity, allow measurement of parameters such as adherence, membrane integrity and metabolic changes associated with irritancy. Organ culture, the isolation and maintenance of animal or human organs, is another in vitro alternative that may be utilized for irritation assessment. However, of the in vitro alternatives currently under development it appears that no single procedure provides a comprehensive evaluation of irritation potential. Rather, a battery of tests may be required to measure the different responses associated with eye-irritancy, e.g. injury/healing and inflammatory response (7, 14, 87).

Recently, major cosmetic firms have actively publicized the use of alternative procedures in their testing programs (123, 125, 128, 132, 133). Noxell Corporation announced the development and use of the Agarose Diffusion Test (132). Other industry giants, such as Avon, announced the use of EYTEX (128). Both tests are considered screening procedures which may greatly reduce the the number of whole animal tests. Despite industry progress, a number of state and federal animal testing bills have been introduced to severely limit or ban the Draize test (see section, Legislative Articles and News Briefs). One possible consequence of a prematurely mandated test ban is the compromise of product safety due to an insufficient number of validated alternative test methods to replace the Draize procedure. For a test to be recognized as valid it must be: 1) demonstrated as reliable within and across different laboratories and, 2) provide meaningful data with regard to chemical safety evaluation (101, 104). Validation is a necessary but time consuming process. Some procedures may take years to validate.

This Special Reference Brief (SRB) is an update to and replaces SRB 89-02. It is designed to serve as an introduction and general overview of the Draize eye-irritancy test. Citations have

been organized into four primary categories: 1) general application and review, 2) alternatives, 3) legal articles and news briefs and, 4) general news briefs. The citations contained herein represent literature gathered from a variety of sources. All citations that are from the NAL collection will include the NAL call number.

The author wishes to express appreciation to Dr. Andrew Rowan for his thoughtful review and comments on the original Special Reference Brief and to Dr. Allen Goldberg for his review of this update.

GENERAL APPLICATION AND REVIEWS

001
"Koseisho report: Reconsiderations of acute toxicity test methods." Pharma Japan 1175:8,9 (October 9, 1989).
DESCRIPTORS: animal tests, Organization for Economic Cooperation and Development, animal protection, acute toxicity tests, LD50 test, Draize test, British Toxicology Society, Ministry of Health and Welfare, method, toxicity, validation, European Community, classification methods, OECD concerns, Japan.

002
"Animal rights, human rights, public rights; The animal rights picture. Medicine speaks out Outlook." Medicine and Health 43 (34):1-4 (August 28, 1989).
DESCRIPTORS: medical research, consumer product testing, Draize eye irritancy test, LD50 test, King, F., Williams, C., Simons, D., animal rights groups, People for the Ethical Treatment of Animals, Newkirk, I., Animal Liberation Front, Physicians for Responsible Medicine, Barnard, N., Animal Rights International, Spira, H., opposition, Wolfle, T., Randolph, J., alternatives, benefits, trends, Goldberg, A., Pfitzer, E., Rich, B., outlook, Rowan, A.

003
"Local irritation study of miporamicin in male rabbits." T. Kohira, D. Nakanishi, I. Goto, Y. Kobayashi, K. Matsumoto, and H. Yamamoto. Japanese Journal of Antibiotics 42 (11):2513-2525 (1989).
DESCRIPTORS: eye and skin irritation, inflammation, histology.

004
"Eye irritation: An ECETOC overview." G.J.A. Oliver, W. Kaestner, B.J.E. Simpson, A.P. Walker, M. York, and W.J. Bontinck. Journal of Toxicology: Cutaneous and Ocular Toxicology 8 (1):51-57 (1989).
DESCRIPTORS: in vitro test, ocular irritation, draize eye irritancy test, screening test, in vivo culture, rabbit.

005
"Animal rights and modern toxicology." L. Rack and H. Spira. Benchmarks: Alternative Methods in Toxicology edited by M.A. Mehlman, pp 193-203. Princeton, N.J., Princeton Scientific Publishing, 1989.
NAL call number: RA1231.T7B45
DESCRIPTORS: animal welfare, animal testing, alternatives.

006
"Adequacy of current in vivo methods." J.M. Frazier, S.C. Gad, A.M. Goldberg and J.P. McCulley. Alternative Methods in Toxicology 4:9-20(1987).
NAL call number: RA1199.A49
DESCRIPTORS: ocular irritancy testing.

007
"Current in vivo testing protocols, procedures, and practices." J.M. Frazier, S.C. Gad, A.M. Goldberg and J.P. McCulley. Alternative Methods in Toxicology 4:9-20(1987).
NAL call number: RA1199.A49
DESCRIPTORS: ocular irritancy testing.

008
"Eye irritation." T.O. McDonald, V. Seabaugh, J.A. Shadduck, and H.F. Edelhauser. Dermatotoxicology 3d ed., edited by F.N. Marzulli, and H.I. Maibach, 641-696. Hemisphere Publishing Corporation: New York, 1987.
DESCRIPTORS: USA, regulation, contact lens, Draize eye-irritancy test.

009
"Assays to determine the ophthalmic irritability of substances applied to the eye mucosa." G. Garcia-Simon, R. Garcia-Alea, and M.L. Calzadilla-Romero. Revista Cubana De Farmacia 20(May-August):127-134(1986).
DESCRIPTORS: toxicity, ophthalmic preparations, Draize eye-irritancy test, FDA.

010
"Correlation of animal eye test data with human experience for household products: An update." F.E. Freeberg, D.T. Hooker, and J.F. Griffith. Journal of Toxicology: Cutaneous and Ocular Toxicology 5(2):115-124(1986).
DESCRIPTORS: Draize eye-irritancy test.

011
"Human and rabbit eye responses to chemical insult." F.E. Freeberg, G.A. Nixon, and P.J. Reer, et al. Fundamental and Applied Toxicology 7(4):626-634(1986).
NAL call number: RA1190.F8
DESCRIPTORS: chemical insult, irritation, Draize eye-irritancy test.

012
"Review on skin and mucous-membrane irritation tests and their application." E. Bosshard. Food and Chemical Toxicology 23(2):149-154(February 1985).
NAL call number: 391.8 F73
DESCRIPTORS: human, animal, Draize eye-irritancy test.

013
"Acute irritation tests in risk assessment." C. Schlatter, and C.A. Reinhardt. Food and Chemical Toxicology 23(2):145-148(February 1985).
NAL call number: 391.8 F73
DESCRIPTORS: experimental animal model, cosmetics, Draize eye-irritancy test.

014
"The Draize test--motivations for change." R. Sharpe Food and Chemical Toxicology 23(2)139-143(February 1985).
NAL call number: 391.8 F73
DESCRIPTORS: eye irritation.

015
"Assessment of the validity of animal techniques in eye-irritation testing." D.W. Swanston. Food and Chemical Toxicology 23(2):169-173(February 1985).
NAL call number: 391.8 F73
DESCRIPTORS: Draize eye-irritancy test.

016
"Changing concepts of ocular irritation evaluation: Pitfalls and progress." S.J. Williams. Food and Chemical Toxicology 23(2):189-193(February 1985).
NAL call number: 391.8 F73
DESCRIPTORS: Draize eye-irritancy test.

017
"Assessment of chemically induced ocular toxicity: A survey of methods." P.K. Chan, and A.W. Hayes. Target Organ Toxicology Series: Toxicology of the Eye, Ear, and other Special Senses.
edited by A.W. Hayes, 103-144. New York, Raven Press, 1985.
DESCRIPTORS: rabbit, animal, Draize eye-irritancy test.

018
"Modification of the Draize eye test for the safety testing of cosmetics." C. Gloxhuber. Food and Chemical Toxicology 23(2):187-188(1985).
NAL call number: 391.8 F73
DESCRIPTORS: modified Draize eye-irritancy test.

019
"The Draize test and modifications." A.W. Johnson, and B.F. Goodwin. Current Problems in Dermatology no.14:31-38(1985).
DESCRIPTORS: Draize eye-irritancy test, modification, rabbit.

020
"Distribution of eye irritation scores of industrial chemicals." W. Kobel and W. Gfeller. Food and Chemical Toxicology 23(2):311-312(1985).
NAL call number: 391.8 F73
DESCRIPTORS: toxic chemicals, Draize eye-irritancy test.

021
"Are local tolerance tests in animals always necessary?" G. Andermann, and M. Erhart. Methods and Findings in Experimental and Clinical Pharmacology 5(5):321-333(June 1983).
DESCRIPTORS: cow, Draize eye-irritancy test, ocular toxicology studies, pharmaco-kinetic modeling.

022
"Relationship between the primary dermal irritation index and ocular irritation." M.R. Gilman, E.M. Jackson, D.R. Cerven, and M.T. Moreno. Journal of Toxicology: Cutaneous and Ocular Toxicology 2(2/3):107-117(1983).
DESCRIPTORS: Draize eye-irritancy test.

023
"Eye irritation testing." K.J. Falahee, C.S. Rose, S.S. Olin and H.E. Siefried. Environmental Protection Agency Report EPA-560/11-82-001 (1981).
DESCRIPTORS: Draize eye-irritancy test, chemical toxicity.

024
"The Draize Test: political and scientific issues". A.N. Rowan. Cosmetic Technology 3(7):32-37(1981).
DESCRIPTORS: Draize eye-irritancy test, alternatives.

025
"Dose-response studies with chemical irritants in the albino rabbit eye as a basis for selecting optimum testing conditions for predicting hazard to the human eye." J.F. Griffith, G.A. Nixon, R.D. Bruce, et al. Toxicology and Applied Pharmacology 55(3):501-513(1980).
DESCRIPTORS: industrial toxic substance, antimicrobial agent, disinfectant agent, drug toxicity, dose response, Draize eye-irritancy test.

026
"Tollerabilita oculare di taluni prodotti di cosmesi con il di Draize." [Draize's test in assessment of eye tolerance to various cosmetic products]. L. Angreassi, A. Nuti, and E. Polito. Archivio per le Scienze Mediche (Torino) 136(2):319-323(April-June,1979).
DESCRIPTORS: shampoo, cosmetology, drug tolerance, Draize eye-irritancy test.

027
"Evaluation of ocular irritation in the rabbit: Objective versus subjective assessment." P. Conquet, G. Curand, J. Laillier, and B. Plazonnet. Toxicology and Applied Pharmacology 39(1):129-139(1977).
DESCRIPTORS: drug screening, cornea thickness, spectrophotometry, cornea edema, conjunctiva edema, Draize score, method evaluation, method comparison, intravenous administration, topical administration, Draize eye-irritancy test.

028
"Animal, human, and microbiological safety testing of cosmetic products." M.J. Thomas, and P.A. Majors. Journal Society of Cosmetic Chemists 24:135-146(February, 1973).
DESCRIPTORS: cosmetic safety, toxicity, regulation, preservatives, stability, patch preservatives.

029
"Rabbit eye irritation test: Collaborative study." F.N. Marzulli, and D.I. Ruggles. Journal. Association of Official Analytical Chemists 56(4):905-914(1973).
DESCRIPTORS: Draize eye-irritancy test, chemical toxicity, methodology.

030
"Study of intra- and interlaboratory variability in the results of rabbit eye and skin irritation tests". C.S. Weil and R.A. Scala Toxicology and Applied Pharmacology 19:276-360(1971).
DESCRIPTORS: Draize eye-irritancy test, laboratory variability.

031
"Methods for the study of irritation and toxicity of substances applied topically to the skin and mucous membranes". J.H. Draize, G. Woodard and H.O. Calvery. Journal of Pharmacology and Experimental Therapeutics 82:377-390(1944).
DESCRIPTORS: toxicity, chemical, methodology, dermal irritancy, eye irritancy.

032
"Acid-base tolerance of the cornea". J.S. Friedenwald, W.F. Hughes, Jr. and H. Herrmann. Archives of Opthalmology (New York) 31:279-283(1944).
DESCRIPTORS: chemical irritation, eye.

Cytotoxic Tests

033
"Participation of the membrane effect to the cytotoxicity of tensio-active agents comparison with ocular irritation in vivo." J.P. Conduzorgues, M. Hagege, M. Dumas, and A. Meybeck. Lens and Eye Toxicity Research 6 (1-2):375-378 (1989).
DESCRIPTORS: eye irritation, cytotoxicity, erythrocyte, cornea, rabbit.

034
"Use of primary rabbit cornea cells to replace the Draize rabbit eye irritancy test." M. Watanabe, K. Watanabe, K. Suzuki, O. Nikaido, I. Ishii, H. Konishi, N. Tanaka, and T. Sugahara. Toxicology in Vitro 3 (4):329-334 (1989).
DESCRIPTORS: animal model, screening test, in vitro cytotoxicity, consumer product testing, cationic and anionic detergents, nonionic compounds.

035
"Assessment of surfactant cytotoxicity comparison with the Draize eye test." P. Tachon, J. Cotovio, K.G. Dossou, and M. Prunieras. International Journal of Cosmetic Science 11 (5):233-244 (1989).
DESCRIPTORS: Chinese hamster, lung fibroblasts, rabbit cornea, lethality, cellular toxicity, potency, in vitro, in vivo.

036
"A critical evaluation of predicting ocular irritancy potential from an in vitro cytotoxicity assay." H.E. Kennah II, D. Albulescu, S. Hignet, and C.S. Barrow. Fundamental and Applied Toxicology 12(2):281-290 (1989).
NAL call number: RA1190.F8
DESCRIPTORS: mouse, rabbit, Draize test, chemical toxicology.

037
"Effect of proteins on the assessment of surfactant cytotoxicity by an in vitro test: Possible correlation with in vivo data." J. Benoit, M. Cormier, and J. Wepierre. Toxicology In Vitro 1(2):91-96(1987).
DESCRIPTORS: human fibroblasts, Draize eye-irritancy test.

038
"Use if the 3T3 cell-neutral red uptake assay for irritants as an alternative to the rabbit (Draize test)." K. Hockley, and D. Baxter. Food and Chemical Toxicology 24(6/7):473-475(June/July 1986).
NAL call number: 391.8 F73
DESCRIPTORS: alternative, fibroblast chemical cytotoxicity assay, Draize eye-irritancy test.

039
"Validation of the uridine uptake inhibition assay in cultured human hepatoma cells." P.J. Dierickx, and M. Martens. Archives Belges di Medecine Sociale, Hygiene, Medecine du Travail, et Medecine Legale 44(11/12):470-477(1986).
DESCRIPTORS: in vitro toxocologic evaluation.

040
"Screening for eye irritancy using cultured HeLa cells." J. Selling and N. Ekwall. Xenobiotica 15(8/9):713-718(August/September 1985).
NAL call number: QD415.A1X4
DESCRIPTORS: Draize eye-irritancy test, cytotoxicity.

041
"Toxicity of commercial products on cells in suspension culture: A possible screen for the Draize eye irritation test." R.B. Kemp, R.W. Meredith, and S.H. Gamble. Food and Chemical Toxicology 23(2):267-270(February 1985).
NAL call number: 391.8 F73
DESCRIPTORS: LS cell, cosmetic toxicity, ATP50, Draize eye-irritancy test.

042
"Prediction of the eye irritation potential of shampoos using the in vitro SIRC cell toxicity test." H. North-Root, F. Yackovich, J. Demetrulias, M. Gacula, Jr, and J.E. Heinze. Food and Chemical Toxicology 23(2):271-273(February 1985).
NAL call number: 391.8F73
DESCRIPTORS: SIRC, rabbit corneal cell, cytotoxicity, Draize eye-irritancy test.

043
"An in vitro cytotoxicity test to predict the ocular irritation potential of detergents and detergent products." M.C. Scaife. Food and Chemical Toxicology 23(2):253-258(February 1985).
NAL call number: 391.8 F73
DESCRIPTORS: in vitro cytotoxicity, Draize eye-irritancy test.

044
"Toxicity monitored with a correlated set of cell-culture assays." E. Borenfreund, C. Shopsis. Xenobiotica 15(8-9):705-712(1985).
NAL call number: QD415.A1X4
DESCRIPTORS: cytotoxicity, Draize eye-irritancy test.

045
"Uridine uptake inhibition as a cytotoxicity test: Correlations with the Draize test." C. Shopsis, and S. Sathe. Toxicology 29(3):195-206(January 1984).
DESCRIPTORS: mouse glial 3T3 cell, xenobiotic addition, Draize eye-irritancy test.

046
"In vitro cytotoxicity assays: Potential alternatives to the Draize ocular allergy test." E. Borenfreund, and O. Borrero. Cell Biology and Toxicology 1(1):55-65(1984).
DESCRIPTORS: chemical cytotoxicity assay, mammalian cell chemistry.

047
"In vitro cytotoxicity assays as potential alternatives to the Draize ocular irritancy test." C. Shopsis, E. Borenfreund, J. Walberg, and D.M. Stark. Alternative Methods in Toxicology 2:101-114(1984).
NAL call number: RA119.A49
DESCRIPTORS: Draize eye-irritancy test.

048
"Toxicity of detergent-based commercial products of on cells of a mouse line in suspension culture as a possible screen for the Draize rabbit eye irritation test." R.B. Kemp, R.W.J. Meredith, S. Gamble and M. Frost. Alternatives to Laboratory Animals: ATLA 11(1):15-21(September 1983).
NAL call number Z7994.L3A5
Descriptors:

049
"A rapid cell culture technique for assessing the toxicity of detergent-based products in vitro as a possible screen for eye irritancy in vivo." R.B. Kemp, R.W. Meredith, S. Gamble, and M. Frost. Cytobios 36(143/144):153-159(1983).
DESCRIPTORS: mouse fibroblast, LS cell, Draize eye-irritancy test.

050
"Evaluation of an in vitro cell toxicity test using rabbit corneal cells to predict the eye irritation potential of surfactants." H. North-Root, F. Yackovich, J. Demetrulias, M. Gacula Jr., and J.E. Heinze. Toxicology Letters 14(3/4):207-212(December 1982).
NAL call number: RA1190.T62
DESCRIPTORS: sirc cell, Draize eye-irritancy test.

051
"Uridine uptake by BALB-C-3T3 cells as a potential in-vitro alternative to the Draize test." C. Shopsis, S. Sathe, and D.M. Stark. 22nd Annual meeting of the American Society for cell biology, Baltimore, MD., USA, November 30-December 4, 1982. Journal of Cell Biology 95(2 part 2):250A(1982).
DESCRIPTORS: abstract, toxicity, Draize eye-irritancy test.

052
"In-vitro alternative irritancy assays comparison of cytotoxic and membrane transport effects of alcohols." E. Borenfreund, C. Shopsis, O. Borrero, and S. Sathe. Annals of the New York Academy of Sciences, volume 407. Cellular Systems for Toxicity Testing Conference, New York, N.Y., USA, October 5-7, 1982, edited by G.M. Williams, V.C. Dunkel, and V.A. Ray, pp 416-419. New York:The New York Academy of Sciences.
DESCRIPTORS: human, Draize eye-irritancy test, mouse.

Cell Function Tests and Organ Culture

053
"A Draize alternative." N.D. Barnard. The Animals' Agenda 9 (5):12-18, 20-21, 57 (June 1989).
NAL call number: HV4701.A45
DESCRIPTORS: animal testing alternatives, cell culture, mice, rabbits, test procedures, agarose, diffusion.

054
"Design and correlation of the CEPA test: An in vitro ocular irritation test." K.Y. Chan. Journal of Toxicology: Cutaneous and Ocular Toxicology 6(3):207-214(1987).
DESCRIPTORS: CEPA test, Draize eye-irritancy test.

055
"Possible eye-irritant test using polysaccharide-coated liposomes as a corneal epithelium model." J. Sunamoto, K. Iwamoto, G. Imokawa, and S. Tsuchiya. Chemical and Pharmaceutical Bulletin 25(7):2958-2965(1987).
DESCRIPTORS: surfactant, liposome, Draize eye-irritancy test substitute.

056
"The chorioallantoic membrane in irritation testing." R.S. Lawrence, M.H. Groom, D.M. Ackroyd, and W.E. Parish. Food and Chemical Toxicology 24(6/7):497-502(June/July 1986).
NAL call number: 391.8 F73
DESCRIPTORS:chick embryo, Draize eye-irritancy test.

057
"The HET-CAM test: Alternative to the Draize eye test." N.P. Leupke, and F.H. Kemper. Food and Chemical Toxicology 24(6/7):495-496(June/July 1986).
NAL call number: 391.8 F73
DESCRIPTORS: Hen's egg test, chorioallantoic membrane toxicity testing.

058
"The use of the chick chorioallantoic membrane to predict eye irritants." J.B. Price, M.P. Barry, and I.J. Andrews. Food and Chemical Toxicology 24(6/7):503-505(June/July 1986).
NAL call number: 391.8 F73
DESCRIPTORS: Draize eye-irritancy test.

059
"The chick embryo in toxicology: An alternative to the rabbit eye." J.Leighton, J. Nassauer, and R. Tchao. Food and Chemical Toxicology 23(2):293-298(February 1985).
NAL call number: 391.8 F73
DESCRIPTORS: Hen's egg test-chorioallantoic membrane, toxicity testing, hen egg chorioallantoic membrane assay, screening techniques.

060
"Hen's egg chorioallantoic membrane test for irritation potential." N.P. Luepke. Food and Chemical Toxicology 23(2):287-291(February 1985).
NAL call number: 391.8 F73
DESCRIPTORS: Hen's egg test (HET), toxicity testing, Draize eye-irritancy test.

061
"An in-vitro alternative to the Draize test." K.Y. Chan. Alternative Methods in Toxicology 3:405-422(1985).
NAL call number: RA1199.A49
DESCRIPTORS: rabbit, human, chemical toxicity, cornea cell culture, Draize eye-irritancy test, eye irritation, chemical in vitro test.

062
"Hen's egg test chorioallantois test: An alternative to the Draize rabbit eye test." N.P. Leupke. Alternative Methods in Toxicology 3:591-605(1985).
NAL call number: RA1199.A49
DESCRIPTORS: Toxicity testing alternative, Draize eye-irritancy test.

063
"The in vitro assessment of eye irritancy using isolated eyes." J.B. Price and I.J. Andrews. Food and Chemical Toxicology 23:313-315 (1985).
NAL call number: 391.8 F73
DESCRIPTORS: organ culture, alternative.

064
"Anatomy of the chick chorioallantoic membrane relevant to its use as a substrate in bioassay systems." J.F. McCormick, J. Nassauer, J. Bielunas, and J. Leighton. Scanning Electron Microscopy 4:2023-2030(1984).
DESCRIPTORS: Draize eye-irritancy test, electron microscopy, toxicologic assay, tumor cell assay, blood, sinus, ectoderm.

065
"Exfoliative cytology as a refinement of the Draize eye irritancy test." J. Walberg. Toxicology Letters 18(1/2):49-55(August 1983).
NAL call number: RA1190.T62.
DESCRIPTORS: alcohol.

066
"Development of a procedure using the chicken egg as an alternative to the Draize rabbit test." J.Leighton, J. Nassauer, R. Tchao and J. Verdone. Alternative Methods in Toxicology 1:163-177(1983).
NAL call number: RA1199.A49
DESCRIPTORS: chemical toxicity assay, chorioallantois, toxicity, Draize eye-irritancy test.

067
"Cell and organ cultures as alternatives in toxicity testing." M. Balls, and S. Horner. Alternatives in Toxicity Testing: ATLA 10(1):16-26(1982).
NAL call number Z7994.L3A5
DESCRIPTORS: Draize eye-irritancy test.

Multiple Test Articles

068
"The SDA alternatives program: Comparison of in vitro data with Draize test data." K.A. Booman, J. De Prospo, J. Demetrulias, A. Driedger, J.F. Griffith, G. Grochoski, B. Kong, W.C.McCormick III, H. North-Root, M.G. Rozen, and R.I. Sedlak. Journal of Toxicology: Cutaneous and Ocular Toxicology 8(1):35-49 (1989).
DESCRIPTORS: ocular irritation, screening test, detergent, chemicals, toxicity testing, chorioallantois, cornea, draize eye irritancy test, rabbit.

069
"Critical evaluation of alternative tests." J.M. Frazier, S.C. Gad, A.M. Goldberg and J.P. McCulley. Alternative Methods in Toxicology 4:45-112(1987).
NAL call number: RA1199.A49
DESCRIPTORS: criteria, protocols, morphological tests, cell toxicity, adhesion, cell proliferation, membrane integrity, cell and tissue, physiology, inflammation, immunity, recovery and repair.

070
"Toxicity monitored with a correlated set of cell-culture assays." E. Borenfreund, and C. Shopsis. Xenobiotica 15(8/9):705-711(August/September 1985).
NAL call number: QD415.A1X4
DESCRIPTORS: alternative toxicity testing, Draize eye-irritancy test.

071
"Ability of in vitro (corneal injury--eye organ--and chorioallantoic membrane) tests to represent histopathological features of acute eye inflammation)." W.E. Parish. Food and Chemical Toxicology 23(2):215-27(February 1985).
NAL call number: 391.8 F73
DESCRIPTORS: Comparision study, Draize eye-irritancy test, cytotoxicity.

072
"A battery of potential alternatives to the Draize test: Uridine uptake inhibition, morphological cytotoxicity, macrophage chemotaxis and exfoliative cytology." C. Shopsis, E. Borenfreund, J. Walberg, and D.M. Stark. Food and Chemical Toxicology 23(2):259-266(February 1985).
NAL call number 391.8 F73
DESCRIPTORS: Mouse 3T3 cell, membrane inflammation.

073
"Comparison of several alternative assays for measuring potential toxicants." D.M. Stark, E. Borenfreund, J. Walberg, and C. Shopsis. Alternative Methods in Toxicology 3:371-390(1985).
NAL call number: RA119.A49
DESCRIPTORS: 3T3 cell, shampoo, Draize eye-irritancy test, SDS toxicity assay, in vitro method.

074
"Alternative approaches to the Draize assay: Chemotaxis, cytology, differentiation, and membrane transport studies." D.M. Stark, C. Shopsis, E. Borenfreund, J. Walberg. Alternative Methods Toxicology 1:179-203(1983).
NAL call number: RA119.A49
DESCRIPTORS: irritant, Draize eye-irritancy test.

Miscellaneous Tests and Articles

075
"In vivo eye irritatior tests and potential alternatives in human drug evaluation." J.M. Davitt. Journal of Toxicology: Cutaneous and Ocular Toxicology 8 (1):103-104 (1989).
DESCRIPTORS: eye irritation, screening test, in vitro, draize eye irritancy test, drug toxicity, rabbit.

076
"The joint government-industry workshop on progress towards non-animal alternatives to the Draize test: Observations and recommendations." J.M. Frazier. Journal of Toxicology: Cutaneous and Ocular Toxicology 8 (1):141-154 (1989).
DESCRIPTORS: in vitro, ocular irritation, screening test, law, toxicity testing, rabbit.

077
"In vitro alternatives to the Draize eye irritation test." K.C. Gupta. Journal of Toxicology: Cutaneous and Ocular Toxicology 8(1):7-16 (1989).
DESCRIPTORS: screening test, toxicity testing, law, rabbit.

078
"Can agencies accept alternative tests for a class of products/compounds? Will changes in acts, regulations or policies be required?". C. Jacobson. Journal of Toxicology: Cutaneous and Ocular Toxicology 8 (1):105-106 (1989).
DESCRIPTORS: eye irritation, screening test, law, draize test, oxicity testing, rabbit.

079
"How to implement alternatives to the Draize eye irritation test for pesticides." J.C. Lamb IV. Journal of Toxicology: Cutaneous and Ocular Toxicology 8 (1):93-101 (1989).
DESCRIPTORS: pesticides, screening test, law, rabbit.

080
"The SDA approach to phase three and beyond." W.C. McCormick III. Journal of Toxicology: Cutaneous and Ocular Toxicology 8 (1):115-125 (1989).
DESCRIPTORS: eye irritation, screening test, in vitro, draize eye irritancy test, toxicity testing, rabbit.

081
"Alternative to harmful animal testing to determine ocular and dermal safety." C.P. Kelly. Humane Innovations and Alternatives in Animal Experimentation 2:27-29(1988).
DESCRIPTORS: alternative, Draize eye-irritancy test, EYTEX, in vitro chemical method.

082
"Potential approaches for the development of in vitro alternatives to eye irritancy tests." J.M. Frazier, S.C. Gad, A.M. Goldberg and J.P. McCulley. Alternative Methods in Toxicology 4:31-44(1987).
NAL call number: RA1199.A49
DESCRIPTORS: discussion and review, morphology, cell toxicity, physiology, testing.

083
"Evaluation of Tetrahymena-thermophile as an in-vitro alternative to ocular irritation studies in rabbits." J. Silverman, and S. Pennisi. Journal of Toxicology: Cutaneous Ocular Toxicology 6(1):33-42(1987).
DESCRIPTORS: Chemical irritancy, Draize eye-irritancy test.

084
"Is an in vitro alternative to the Draize eye test in sight?" C.K. Muir. ICLAS Bulletin, no.57(Autumn 1986):16-17.
NAL call number: 410 IN84

085
Alternatives to Animal Use in Research, Testing, and Education. U.S. Congress, Office of Technology Assessment. OTA-BA-273(February 1986).
DESCRIPTORS: Draize eye-irritancy test, LD50, alternatives.

086
"Uncovering alternatives to live animal tests." C. Muller-Wainwright. Drug and Cosmetics Industry 138(6):42, 44, 47-48(1986).
DESCRIPTORS: toxicity, cosmetic industry, Draize eye-irritancy test, test validation.

087
"Developing an in vitro system to replace the Draize rabbit eye irritancy test." D.M. Stark, E. Borenfreund. Alternatives to Laboratory Animals: ATLA 12(4):247-250(June 1985).
NAL call number: Z7994.L3A5
DESCRIPTORS: in vitro test, alternative.

088
"The rabbit eye irritancy test--are there in vitro alternatives." M.C. Scaife. Alternatives to Laboratory Animals: ATLA 12(3):157-162(March 1985).
NAL call number: Z7994.L3A5
DESCRIPTORS: rabbit, Draize eye-irritancy test, in vitro alternatives.

089
"An Approach to the development of in vitro toxicological methods." A.M. Goldberg. Food and Chemical Toxicology 23(2):205-208(1985).
NAL call number: 391.8 F73
DESCRIPTORS: Draize eye-irritancy test, alternatives.

090
"Alternatives to animal testing." E.M. Jackson. Journal of Toxicology: Cutaneous and Ocular Toxicology 3(4):333-336(1985).
DESCRIPTORS: Cosmetics, Draize eye-irritancy test.

091
"The future of animals in research and training. The search for alternatives." A.N. Rowan. Fundamental and Applied Toxicology 4(4):508-516(August 1984).
NAL call number: RA1190.F8
DESCRIPTORS: animal welfare, toxicology, Draize eye-irritancy test.

092
"Toxicity testing--progress towards alternative techniques (Animals, Draize eye test as target of public and scientific criticism)." G. Langley. Laboratory Practice 33(1):35-36(January 1984).
NAL call number: Q183.L3
DESCRIPTORS: animal, Draize eye-irritancy test.

093
"Preliminary findings of the use of protozoa (Tetrahymena thermophile) as models for ocular irritation testing in rabbits." J. Silverman. Laboratory Animal Science 33(1):56-59(February 1983).
NAL call number: 410 9P94
DESCRIPTORS: in vitro test, Draize eye-irritancy test.

Reduction and Refinement

094
"An objective procedure for quantitating eye irritation based upon changes of corneal thickness." H.E. Kennah II, S. Hignet, P.E. Laux, J.D. Dorko, and C.S. Barrow. Fundamental and Applied Toxicology 12 (2): 258-268 (1989).
NAL call number: RA1190.F8
DESCRIPTORS: rabbit, chemical toxicology, Draize test, conjunctival damage.

095
"Reducing the number of rabbits in the Draize eye irritancy test: A statistical analysis 155 studies conducted over 6 years." D.M. Talsma, C.L. Leach, N.S. Hatoum, R.D. Gibbons, J.C. Roger, and P.J. Garvin. Fundamental and Applied Toxicology 10(1):146-153(January 1988).
NAL call number: RA1190.F8
DESCRIPTORS:

096
"Prediction of ocular irritation by corneal pachymetry." R.L. Morgan, S.S. Sorenson, and T.R. Castles. Food and Chemical Toxicology (England) 25(8):609-613(August 1987).
NAL call number: 391.8 F73
DESCRIPTORS: alternative, reduction, Draize eye-irritancy test.

097
"Reduction of animal usage: British Pharmacopoeia Commission policy." M.L. Rabouhans. Developments in Biological Standardization 64:11-16(1986).
DESCRIPTORS: alternative, rabbit.

098
"Statistical consequences of reducing the number of rabbits utilized in eye irritation testing: Data on 67 petrochemicals." D.J. DeSousa, A.A. Rouse, and W.J. Smolon. Toxicology and Applied Pharmacology 76(2):234-242(November 1984).
DESCRIPTORS: Draize eye-irritancy test.

099
"The concept of the three R's. An introduction." A.N. Rowan. Developments in Biological Standardization 45:175-180(1980).
DESCRIPTORS: alternatives reduction replacement refinement laboratory animals.

Calibration and Validation

100
"Use of human experience to calibrate Draize and in vitro eye test data." J.F. Griffith. Journal of Toxicology: Cutaneous and Ocular Toxicology 8 (1):17-22 (1989).
DESCRIPTORS: ocular irritation test, screening test, draize eye irritancy test, calibration, rabbit.

101
"Validation criteria for ocular irritation in vitro alternative tests". W.H. Koch. Journal of Toxicology: Cutaneous and Ocular Toxicology 8 (1):17-22 (1989).
DESCRIPTORS: screening test, draize eye irritancy test, toxicity, rabbit.

102
"Considerations in calibrating alternative tests." J. Murphy. Journal of Toxicology: Cutaneous and Ocular Toxicology 8 (1):85-92 (1989).
DESCRIPTORS: eye irritation, screening test, in vitro test, toxicity tests, draize eye irritation test, calibration, rabbit.

103
"Validation of five alternative methods 4 cell tests plus hen's egg test for predictive eye irritation testing Draize test." C.A. Reinhardt, M. Aeschbacher, M. Bracher, and J. Spengler. Experientia (Basel) 43(6):708(1987).
DESCRIPTORS: abstract, guinea-pig, rat, human, BHK, 21-C13 cell, cosmetics industry, Draize eye-irritancy test.

104
"Validation." J.M. Frazier, S.C. Gad, A.M. Goldberg and J.P. McCulley. Alternative Methods in Toxicology 4:113-117(1987).
NAL call number: RA1199.A49.
DESCRIPTORS: preliminary validation, microvalidation, macrovalidation.

105
"HHS opposes legislation requiring justification of animal testing; whole animal models irreplaceable." Drug Research Reports: The Blue Sheet 32 (46):5 (November 15, 1989).
DESCRIPTORS: proposed legislation, Mason, J., Reid, H., LD50 data, Senate hearing , Consumer Product Safety Testing Act (CPSTA), HHS, opposition, House version, Boxer, B., animal testing restrictions, provisions, Draize rabbit eye irritation tests, arguments.

106
"HHS opposes restrictions on animal testing". FDC Reports: The Rose Sheet. 10 (46):5,6 (November 13, 1989).
DESCRIPTORS: Consumer Products Safe Testing Act (CPSTA), Reid, H., Mason, J., LD50 data, Senate hearing, animal testing restrictions, HHS opposition, proposed legislation, House version, Boxer, B., provisions, Draize eye irritancy test, Barnard, N., Kimm, V., Stephens, M., Hazard, H., Sevanian, A.

107
"HHS opposing legislation requiring justification of animal testing". FDC Reports: The Pink Sheet. 51 (46):T&G,11,12 (November 13, 1989).
DESCRIPTORS: Mason, J., Reid, H., LD 50 data, legislation proposed, HHS opposition, Senate hearing, animal testing restrictions, Consumer Product Safety Testing Act (CPSTA), House version, Boxer, B., provisions, arguments, Draize eye irritancy test.

108
"California Assembly's anti-animal testing bill fails first vote."
FDC Reports: The Rose Sheet. 10 (26):3,4 (June 26, 1989).
DESCRIPTORS: O'Donnell, Assemblyman, proposed legislation, California assembly, update, CTFA opposition, Avon, Mary Kay, Noxell, Procter and Gamble, Johnson & Johnson, animal testing restrictions, People for the Ethical Treatment of Animals, Draize eye irritancy test, Eytex in vitro method, Preston, J., company statements, Cosmair, Gillette, PETA protests.

109
"Draize test would be criminal offense under California bill."
FDC Report: The Rose Sheet. 10 (14):5,6 (April 3, 1989).
DESCRIPTORS: Draize eye irritancy test, LD50, proposed legislation, felony, California, O'Connell, Mr., progress update, Maryland, Garrott, I., Massachusetts, Connecticut, Schering Plough shareholder proposal, Agarose Diffusion Method.

110
"Animal testing bills introduced in Connecticut and Massachusetts." FDC Reports: The Rose Sheet. 10 (10):10,11 (March 6, 1989).
DESCRIPTORS: Pennsylvania, Draize eye irritancy test, LD50, Massachusetts, Albano, Sen., legislation proposed, Connecticut, Upson, Sen., Murphy, Rep., animal testing bans, People for the Ethical Treatment of Animals, Avon, Preston, J., PETA boycott, company statement, Cosmetic, Toiletry and Fragrance Association, CFTA comment, Rich, S.

111
"Regulatory considerations for alternatives to the Draize eye test". S. Green. Journal of Toxicology-Cutaneous and Ocular Toxicology 8 (1):59-67 (1989).
DESCRIPTORS: ocular irritation, screening test, toxicity testing, in vitro tests, rabbit.

112
"In brief." FDC Reports: The Rose Sheet 9(7):back page(February 15, 1988).
DESCRIPTORS: Maryland, animal testing ban, LD50 and Draize eye-irritancy test, Garrott, I., legislation proposed.

113
"Australian news in brief." Animal Pharmacology World: Animal Health News no.118:16(November 28, 1986).
DESCRIPTORS: Victoria State, LD50 test, proposed ban, Australia, live animals, Draize eye-irritancy tests, Walter, E.

114
"UK animal tests bill becomes law." World Pharmaceutical News no.1106:3(May 28, 1986).
DESCRIPTORS: UK, Animals (Scientific Procedures) Bill, animal welfare, animal experiments, provisions, Draize test, LD50 test, enforcement, controls, penalties.

115
"UK news in brief." World Pharmaceutical News no.1083:6(March 10, 1986).
DESCRIPTORS: progress update, UK, animal tests bill, Draize and LD50 tests, Cohen, H.

116
"UK animal tests bill progresses." World Pharmaceutical News no.1080:4(February 26, 1986).
DESCRIPTORS: UK, Animals (Scientific Procedures) Bill, progress update, Draize test, Hurd, D.

117
"Second UK animal tests bill: Amendments." Animal Pharmacology World: Animal Health News no.98:3(February 14, 1986).
DESCRIPTORS: UK, Cohen, H., Draize eye-irritancy test, LD50 poisoning test, legislation proposed, controls, second experiment under sedation.

118
"UK news in brief." World Pharmaceutical News no.1076:2(February 12, 1986).
DESCRIPTORS: UK, government guidance, Draize eye-irritancy test use, Mellor, D.

119
"Second UK animal tests bill: Amendment." World Pharmaceutical News no.1072:1(January 29, 1986).
DESCRIPTORS: private member bill, animal experiments, UK, Cohen, H., proposals, Draize eye-irritancy test, LD50 toxicity test, legislation proposed, government bill/amendment, Houghton, Lord.

120
"Registration requirements within the German Federal Health Office." W. Lingk. Food and Chemical Toxicology 23(2):179-181(February 1985). NAL call number: 391.8 F73.
DESCRIPTORS: Draize eye-irritancy test, West Germany, dermal irritation.

121
"In brief." FDC Reports: The Rose Sheet 6(2):15(January 14, 1985).
DESCRIPTORS: House Concurrent Resolution 15, Jacobs, A., Draize test alternatives.

122
"In brief." Medical Devices, Diagnostic and Instrumentation Reports: The Grey Sheet 11(2):13(January 14, 1985).
DESCRIPTORS: Jacobs, A, House Concurrent Resolution 15, Draize eye-irritancy test, legislation proposed, alternatives.

GENERAL NEWS BRIEFS

123
"FRAME test Draize alternatives." SCRIP World Pharmaceutical News 1485:26 (February 2, 1990).
DESCRIPTORS: Fund for the Replacement of Animals in Medical Experiments (FRAME), neutral red release method (NRR), Draize eye irritancy test, alternatives, EYTEX, data bank, evaluations.

124
"CFTA beginning Phase II of Draize alternatives evaluation program". FDC Reports: The Rose Sheet 10 (46):7 (November 15, 1989).
DESCRIPTORS: Draize eye irritatancy test, alternatives, evaluation, Cosmetic, Toiletry and Fragrance Association (CFTA), protocols, Gillete, Revlon, Colgate Palmolive, Dial, Johnson & Johnson, Estee Lauder.

125
"Avon will announce "permanent end" to animal testing." FDC Reports: The Rose Sheet. 10 (24):1,2 (June 12, 1989).
DESCRIPTORS: Avon, boycott, People for the Ethical Treatment of Animals, Preston, J., non-animal alternative Draize Eye Irritancy test, Eytex, PETA budget, Procter & Gamble, University Animal Alternatives Research Program.

126
Soap, Cosmetics, Chemical Specialties 65 (6):66 (June 1989).
DESCRIPTORS: US cosmetic test, Eytex, Draize eye irritancy test, animal use, alternatives, Avon Products Inc.

127
"J&J lab animal usage cut 80% in non-medical product testing." FDC Reports: The Rose Sheet. 10 (16):10 (April 17, 1989).
DESCRIPTORS: Johnson & Johnson, in vivo test, Spira, H., reductions, alternatives, in vitro methods, Draize testing, LD50 test, research grant, University of Texas, Johns Hopkins Center for Alternatives to Animal Testing, sponsors, Avon, Revlon, Procter & Gamble.

128
"Avon replacing Draize test with Eytex in vitro system." FDC Report: The Rose Sheet. 10 (15):6 (April 10, 1989).
DESCRIPTORS: Avon, Draize test alternatives, study results, comparisons, Eytex assay, safety approval process, in vitro methodologies, CFTA programs, Gillette, Revlon, Colgate-Palmolive, Dial, Johnson & Johnson, Estee Lauder, Agarose Diffusion Method, Noxell.

129
Soap, Cosmetics, Chemical Specialties 65 (4):12 (April 1989).
DESCRIPTORS: cosmetic tests, Draize eye irritancy test, state legislation, US.

130
High Technology Business 9 (3):10 (March 1989).
DESCRIPTORS: cosmetic tests, drug use, Tetrahymena thermophila test, Ohio State University.

131
Soap Cosmetics, Chemical Specialties 65 (2):80 (February 1989).
DESCRIPTORS: cosmetics, ocular safety test, agarose diffusion, Draize eye irritancy test, alternative, Noxell Corp..

132
"Noxell in vitro Draize replacement will reduce firm's animal use 80-90%." FDC Reports: The Rose Sheet. 10 (1):1-3, (January 2, 1989).
DESCRIPTORS: eye safety testing, Noxell, alternatives, Agarose Diffusion Method, Draize replacements, animal use reduction, Battelle Institute, Cosmetic, Toiletry and Fragrance Association, CTFA testing program, ADM costs, procedures, correlation, comparisons, publications.

133
"Cosmetics firms drop Draize test." C. Holden, Science. 245 (4914):125 (1989).

134
"LD50 and Draize tests to go." Australian Veterinary Journal. 66 (2):26 (1989).

135
"Non-animal testing: CTFA will begin evaluating 14 in vitro protocols." FDC Reports: The Rose Sheet 9(2):7(January 11, 1988).
DESCRIPTORS: Cosmetic, Toiletry and Fragrance Association, non-animal test methods, CSTA evaluation, Johns Hopkins University Center for Alternatives to Animal Testing, testing program, McNerny, J., costs, Draize eye-irritancy test substitute, funding, Kavanaugh, E., Spira, H.

136
"Johns Hopkins animal testing alternatives center: Five of six new grants awarded." FDC Reports: The Rose Sheet 8(12):10 (March 23, 1987).
DESCRIPTORS: applications for cosmetics testing, grants, Draize eye-irritancy test, Bauman, T., LaMonte, R., McQueen, C., Johns Hopkins Center of Alternatives to Animal Testing, Mortensen, R., Huang, P, research projects, Hurko, O., Grossman, S., Gilbert, M., Rockefeller University Animal Research Center, Revlon.

137
"Focus on developing in vitro technologies." PTS Annual Reports December 28, 1986.

138
"CTFA's Draize test modification using anesthetics can reduce pain." FDC Reports: The Rose Sheet 7(44):6(November 3, 1986).
DESCRIPTORS: cosmetic toiletry and Fragrence Association, Modified Ocular Safely Testing Task Force, study conclusions, Draize eye-irritancy testing modification, proparacaine, tetracaine, anesthetic pretreatment, test protocols, Arthur, B., Pennisi, S., Dipasquale, L., Re, T., Dinardo, J., Kennedy, G., North-Root, H., Penny, D., Sekerke, J.

139
"Animal experiments in research." World Pharmaceutical News no.1112:6(June 18, 1986).
DESCRIPTORS: Bodmer, W., UK, seminar, animal experiments, brain experiments, Blakemore, C., substitutes, cost/benefit analysis, "pure" research, heparin, Sleight, P., animal models, ICI, in vitro screening techniques, Purchase, I., LD50 toxicity and Draize eye-irritancy tests, comments, Animals (Scientific Procedures) Act, Hampson, J.

140
"Alternatives to the Draize test." World Pharmaceutical News no.1096:16(April 23, 1986).
DESCRIPTORS: potential alternatives, Draize eye-irritancy test, validation study, Goldberg, A., US, R&D progress update, federal activity, in vitro tests.

141
"Eye Research Institute's new in vitro cosmetics eye irritancy study." FDC Reports: The Rose Sheet 7(16):10(April 21, 1986).
DESCRIPTORS: Eye Research Institute, Neufeld, A., Junblatt, M., Johns Hopkins Center for Alternatives to Animal testing, ERI test, Draize eye-irritancy test alternative, in vitro method.

142
"Johns Hopkins Center's Draize alternatives validation program." FDC Reports: The Rose Sheet 7(16):9,1(April 21, 1986).
DESCRIPTORS: Center for Alternatives to Animal Testing, Draize eye-irritancy test replacements, grant, Bausch & Lomb, progress update, McCulley, J., Dad, S., Frazier, J., Review publication, in vitro alternatives.

143
"An alternative to the Draize test." Chemical Week 138(16):33(April 16, 1986).
NAL call number: 381 C426.
DESCRIPTORS: in vitro Draize eye-irritancy alternative, Eye Research Institute, household product test, toxic cosmetic test, in vitro cosmetic test, corneal epithelial cell.

144
"Revlon continues support of Rockefeller animal research center." FDC Reports: The Rose Sheet 7(8):10,1(February 24, 1986).
DESCRIPTORS: grant, Stark, D., Draize eye-irritancy test, in vitro assay systems, Revlon, Rockefeller research center, animal testing alternatives, validation project.

145
"Avon developed 87% of 1985 formulations without additional animal tests." FDC Reports: The Rose Sheet 7(6):4(February 10, 1986).
DESCRIPTORS: Spira, H., Avon, animal use reduction, pain reduction methods, Draize eye-irritancy test modifications, research grants.

146
"Johns Hopkins animal testing alternatives center: Nine new grants were awarded." FDC Reports: The Rose Sheet 7(6):3,4(February 10, 1986).
DESCRIPTORS: grants, Cosmetic, Toiletry, and Fragrance Association, Elgebaly, S., chemotactic factors, Johns Hopkins Center for Alternatives to Animal Testing, Meyer, D., Draize eye-irritancy test, R&D activity, Trush, M, toxicity, Webber, M., Sens, M., Powis, G., Smith, M., Tammi, P., Dannenberg, A., DeLeo, V., Jumblatt, M., Neufeld, A.

147
"In brief." FDC Reports: The Rose Sheet 7(5):14(February 3, 1986).
DESCRIPTORS: LD50 test, Draize eye-irritancy test, Office of Technology Assessment, alternatives.

148
"Improved research models developed." PTS Annual Reports (December 29, 1985).

149
"Animal test alternatives: Rockefeller. Johns Hopkins utilize separate routes." by Carrie Muller. Drug and Cosmetics Industry 136(4):36-38,40(April, 1985).
DESCRIPTORS: chemical animal test alternative research, US, Draize eye-irritancy test alternative, chemical research, Rockefeller University, Johns Hopkins University.

150
"Draize test used by 81% of CTFA members responding to a survey." FDC Reports: The Rose Sheet 6(12):6,7(March 25, 1985).
DESCRIPTORS: Humane Society's Institute for the Study of Animal Problems, Cosmetic, Toiletry and Fragrance Association CTFA member use, ISAP questionnaire, Draize eye-irritancy test, LC50, acute toxicity test, animal testing, survey results, Almay, Beecham Fraberge, Colgate, Cosmair, Clairol, Chanel, Estee Lauder, Conair, Dana Perfumes, Mary Kay.

151
"FDA, CTFA replies to animal rights letters totaled over 600." FDC Reports: The Rose Sheet 6(11):5,6(March 18, 1985).
DESCRIPTORS: Cosmetic, Toiletry and Fragrance Association, cosmetics safety testing, Draize eye-irritancy test, consumer challenges, DFA/CTFA responses, animal use, LD50 test, McArdle, J., Humane Society list, companies that do not do animal testing, Bonne Bell, Darme, Celestial Seasonings, Jojoba Resources, Nature de France.

152
"In brief." FDC Reports: The Rose Sheet 6(11):14(March 18, 1985).
DESCRIPTORS: Draize alternatives, policy issues and options Office of Technology Assessment advisory panel.

153
"Product news in brief." World Pharmaceutical News no.997(February 27, 1985).
DESCRIPTORS: Draize eye-irritancy test alternatives, Leicester Polytechnic, UK, Muir, C.

154
"Johns Hopkins animal testing alternatives center awards three new grants." FDC Reports: The Rose Sheet 6(8):6-7(February 25, 1985).
DESCRIPTORS: grants, DeLio, V., Draize eye-irritancy test alternative, Szidon, J., animal testing alternatives center, Hales, B., Johns Hopkins, skin irritation testing, Dannenberg, A., in vitro methods, Dubin, N., Edidin, M., Krag, S., Sannes, P., Guy, R., artificial skin, Kochevar, I., Jumblatt, M.

155
"Revlon renews support of Rockefeller animal research center." FDC Reports: The Rose Sheet 6(8):5(February 25, 1985).
DESCRIPTORS: animal testing alternatives center, grant, Revlon, Rockefeller University, in vitro alternative, research center's activities, Stark, D., Draize test alternative systems, exfoliative cytotoxicity, membrane transport, Neutral Red 90 test.

156
"AFAAR grant for in vitro method to reduce use of LD50 awarded to Pennsylvania Medical College." FDC Reports: The Rose Sheet 6(1):8(January 7,1985).
DESCRIPTORS: Leighton, J., American Fund for Alternatives to Animal Research, in vitro evaluation, University of Pennsylvania, LD50 test, chemical toxicity testing, AFAAR grant, animal testing alternatives, Draize eye-irritancy test, Colgate-Palmolive.

157
"Hens' eggs in toxicity testing." World Phamaceutical News no.962:19(January 7, 1985).
DESCRIPTORS: mucous membrane toxicity testing, University of Munster, Draize eye-irritancy test alternative,* Federal Republic of Germany, study results.

158
"Alternatives to rabbits for eye tests." Chemical Week 135(18):96(October 31, 1984).
NAL call number: 381 C426.
DESCRIPTORS: cosmetics, Draize eye-irritancy test alternative, Johns Hopkins University, human eye cell in vitro cosmetic test alternative.

159
"Revlon funds more research toward Draize test substitute." S. Randel. Genetic Engineering News 4(3):38(July/August, 1984).
NAL call number: QH442.G456.
DESCRIPTORS: Revlon Inc., cosmetic company research fund update, US, Draize eye-irritancy test substitute, research fund (cosmetic company) update, Rockefeller University.

160
"European news in brief." World Phamaceutical News no.911:2(July 4, 1984).
DESCRIPTORS: UK, government grant, Fund for the Replacement of Animals in Medical Experiments, animal alternatives sought for Draize eye-irritancy test, LD50 test, FRAME projects.

161
"Colgate-Palmolive lab animal use reduced by more that 50%." Drug Research Reports: The Blue Sheet 27(23):8(June 6, 1984).
DESCRIPTORS: Coalition to Stop the LD50, Spira, H., Colgate-Palmolive's in-house program, Draize eye-irritancy test, lab animal use reduction, symposium, pain prevention, animal experiments, Avon program.

162
"Looking for alternatives to animal tests." Chemical Week 134(21):35(May 23, 1984).
NAL: 381 C426.
DESCRIPTORS: drug research animal test alternative, Revlon Inc., Rockefeller University.

163
"Animal test alternatives: A progress report." R. Richards. Drug Cosmetic Industry 134(4):24-25(April, 1984).
NAL call number: 396.8 D842.
DESCRIPTORS: toxicity test alternative progress report, Rockefeller University, Revlon Inc., animal toxicity test alternative progress report.

164
"Rockefeller University lab animal center gets $250,000 grant from Revlon." Drug Research Reports: The Blue Sheet 27(9):9,10(February 29, 1984).
DESCRIPTORS: Draize eye-irritancy test alternatives, grant: Revlon, Rockefeller University Lab Animal Research Center, Stark, D., papers published, Borenfreund, E., Shopsis, C.

165
"Product news in brief." World Pharmaceutical News no.845:15-18(November, 9, 1983).
DESCRIPTORS: Draize eye-irritancy test, alternative, Kemp, R.

166
"Revlon Project shows promise for Draize test alternative." Drug Cosmetic Industry 133(1):44,79-80(July, 1983).
NAL call number: 396.8 D842
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